

***SURFACE CLOUD RADIATIVE FORCING, CLOUD FRACTION AND CLOUD
ALBEDO: THEIR RELATIONSHIP AND MULTISCALE VARIATION***

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ABSTRACT

Cloud-radiation interactions constitute a major problem in understanding of the Earth's climate and prediction of human-induced climate change. Cloud-radiative forcing, cloud fraction, and cloud albedo are three key quantities that have been used to quantify the effect of clouds on radiation budget in both modeling and observational studies. In this work, we examine the cloud radiative forcing at the surface, cloud fraction, cloud albedo, and their relationships using long-term data derived from the surface-based radiation and cloud measurements collected by the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Program at the Southern Great Plain (SGP) site since 1997. The variations of these three quantities over diurnal, annual and inter-annual scales are analyzed. The results derived from the National Centers for Environmental Prediction (NCEP) reanalysis over the same period are also compared against the observations to identify the potential problems in the model used in the reanalysis.

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